

Santa Monica Bay Restoration Commission

Progress Report on Implementation of the
Santa Monica Bay Comprehensive Monitoring Program

April 2016

Background

Overview of the Santa Monica Bay CMP

The Santa Monica Bay Comprehensive Monitoring Program (CMP), which was completed in 2007, represents the Santa Monica Bay Restoration Commission (SMBRC)'s and the Santa Monica Bay National Estuary Program (SMBNEP¹)'s plan for implementing coordinated monitoring to provide a regional, long-term assessment of the status of the various ecosystems in Santa Monica Bay. The CMP was designed to shift the focus of monitoring from water quality of point source discharges to ecological conditions of the Bay habitats and fill the identified data gaps. The CMP was developed under the auspices of the SMBRC Technical Advisory Committee, through collaboration of major dischargers and regulatory agencies, including the Los Angeles Regional Water Quality Control Board (LARWQCB). Information collected for the CMP is essential to, and has been used for tracking, assessing, and reporting on the environmental results of management actions implemented to improve water quality and restoration habitats in the Bay and its watershed.

The CMP includes monitoring designs for five major habitat (or ecosystem) types within the Bay. These five habitats extend from the outer Bay to the high tide line along the shore and include the following:

- Pelagic Ecosystem
- Soft Bottom Ecosystem
- Hard Bottom Ecosystem
- Rocky and Sandy Intertidal
- Wetlands

Monitoring design for each habitat includes a core motivating question, related objectives, specific monitoring approaches, indicators, data products, as well as sampling designs detailing number and locations of stations, sampling frequency, and measurements to be collected. In addition, the CMP includes an implementation plan that suggests how each design element of the program could be funded through a combination of cooperative agreements, offsets to current compliance monitoring programs, and grant funding from a range of potential sources.

¹ Santa Monica Bay Restoration Commission (SMBRC) is the state entity partner of the SMBNEP. Other partners of the SMBNEP include the Bay Foundation (TBF) and the Santa Monica Bay Restoration Authority (SMBRA).

Overview of NPDES Monitoring Requirements

The LARWQCB supported the CMP implementation by adding requirements to the National Pollutant Discharge Elimination System (NPDES) permits of the two POTWs and the Chevron Refinery, enabling the dischargers to participate and contribute to the CMP implementation. The 2010 Hyperion Treatment Plant NPDES permit (permit) requires the discharger, each year at a spring LARWQCB meeting, to “...provide an informational report summarizing to date its contributing activities toward coordinated implementation of the Comprehensive Monitoring Program for Santa Monica Bay (SMBRC, January 2007).” In the 2011 Joint Water Pollution Control Plant NPDES permit, LARWQCB added a new requirement to provide an annual informational report summarizing the Sanitation Districts of Los Angeles County (LACSD)’s activities related to the coordinated implementation of the CMP. In addition, the 2013 Chevron El Segundo Refinery NPDES permit included a requirement to provide a similar informational report summarizing the company’s activities related to the coordinated implementation of the CMP. The SMBRC will use these informational reports to prepare and present a progress report on CMP implementation to the LARWQCB at one of its spring meetings.

In previous four years, both the City of Los Angeles Bureau of Sanitation (City of LA) and the LACSD submitted the informational reports summarizing their CMP implementation-related activities as required under the permit. Chevron El Segundo Refinery also submitted its informational report in the last two years. Using materials provided in these reports and other sources of information, the SMBRC prepared progress reports on CMP implementation for the LARWQCB and presented the reports in the last three years at the May Board meetings.

The progress status reported below is an update to the 2015 progress report based on new information provided in the 2016 informational reports recently-submitted by the three reporting entities (Appendices A, B, and C) as well as other information compiled by the SMBRC.

Progress and Status of Santa Monica Bay CMP Implementation

Progress continued in implementing the CMP during this reporting period (2015). Table 1 below summarizes the key program components of the CMP, the latest status of implementation, and the recommended future steps for achieving full implementation of the CMP. The table also specifically indicates the areas of contribution and support by the City of LA, the LACSD, and Chevron, and highlights new activities during this report period (in yellow shade. As the table shows and the attached informational reports elucidate, all three entities fulfilled their responsibilities under the permit and conducted monitoring activities in support of the CMP implementation.

The table also points out several new projects and activities in 2015 that contributed to filling remaining monitoring gaps identified in the CMP and facilitated further progress in implementing the CMP in the years ahead. These activities, several are highlighted below, also demonstrate the benefits of the CMP and the need to update the CMP in response to new management priorities, such as the need to understand and address the impacts of nutrient loading and climate change.

State of the Bay Report: The State of the Bay (SOTB) 2015 report was completed by the Santa Monica Bay National Estuary Program in 2015 and published as a special issue of the *Urban Coast* (<http://urbancoast.org>) in January 2016. The fifth published since 1993, the report is a science-based comprehensive assessment of the environmental conditions of Santa Monica Bay and its watershed. The report is informed and largely prepared by SMBRC's Technical Advisory Committee (TAC), a group of experts in their respective fields. It measures the status and trends of all major types of habitats in the Bay by a set of habitat health indicators in a consistent manner under a new framework designed by the TAC. The SOTB 2015 report also includes featured articles written by TAC members and invited experts discussing a wide range of issues pertinent to Bay restoration progress and challenges.

The development of the SOTB 2015 relies heavily on data collected under the CMP and the collaboration and cooperation of the CMP-participating entities. Staff from both the LACSD and City of LA assisted and participated in development of the SOTB 2015. They also provided data collected under their NPDES permits, many were called for by the CMP to be used for the report's assessment on the status and trends of ecological health of several Bay habitats. Examples of data used in the SOTB 2015 include:

- Benthic Response Index (BRI) values showing the percentage of area in each class defined by BRI threshold values as an indicator of soft bottom benthic community condition, based on data generated by the LACSD and City of LA. The data depicted in the report were analyzed and mapped by these entities specifically for the purpose of the SOTB 2015.
- Changes in kelp canopy in Santa Monica Bay between 2009 and 2014 as an indicator of rocky reef habitat in the Bay, based on data generated and provided by the Central Region Kelp Survey Consortium.
- The frequency of low oxygen and corresponding high density water in the bottom 5m of the water column in Santa Monica Bay as an indicator of the extent of hypoxic conditions of the Bay's pelagic habitat, based on data generated by the LACSD and City of LA. The data depicted in the report were also analyzed and mapped by these entities specifically for the purpose of the SOTB 2015.

The SOTB 2015 also identified many existing and new data gaps, mainly indicators incorporated in the assessment but with no current monitoring data to report on. These data gaps should be addressed through future update of the CMP.

Climate Change Impact Assessment and Adaptation Planning – In 2015, the three entities and the SMBRC continue to collaborate with other federal, state, and local entities to carry out research, monitoring, and planning efforts needed for addressing the potential impacts of climate change, with more focus on the causes and impacts of ocean acidification and hypoxia. These efforts include, but are not limited to the following:

- *Bight' 13 monitoring program* – All three entities are active participants of the Bight' 13 program, as discussed in detail in their progress reports (Appendices A-C). Under the Bight' 13 Nutrients Program, a set of sampling and data analysis for pH and alkalinity are being conducted, aimed at determining the spatial patterns and seasonality of pH and

aragonite saturation state in the SCB. This effort will help to understand possible alterations to the southern California coastal ocean environment due to global climate change, as well as local anthropogenic factors that may contribute to observed changes. The coordinated offshore sampling for pH and alkalinity analyses in support of the Bight '13 began in spring 2014 and was completed in February 2016.

- *Historical POTW monitoring data review* - As part of Bight'13, the participants have mined selected data from the historical POTW water quality sampling programs. These efforts, which are still in progress, will provide a thorough assessment of historical pH data (measured continuously on CTD casts at over 300 sites each quarter) and determine whether the quality of these data is sufficient to define nearshore temporal trends in the Santa Monica Bay and in the inshore SCB waters going back 30 years or more to characterize small scale spatial patterns within the SCB. A similar historical review of POTW chlorophyll-a fluorescence data is nearly complete.
- Encouraged by the early results from the historical data review, the LACSD proposed a special study under its NPDES permit in 2016 to do a similar review and analysis of the CalCOFI data set applicable to the entire SCB. If approved, the special study will provide support to SCCWRP researchers to carry out the review and prepare a summary report for publication. The results are expected to be invaluable to put the patterns, levels, and trends seen of primary productivity in Santa Monica Bay in context with the rest of the SCB.
- *Mooring for long-term, continuous monitoring* - In 2015, the SMBNEP was awarded a US EPA grant to install a package of state-of-art sensors to measure ocean acidification and hypoxia (OAH) in Santa Monica Bay. LACSD proposed a special study under its NPDES permit to support this project in the deployment and maintenance of a mooring and the sensor package on the Palos Verdes shelf. City of LA will provide laboratory support for calibration sample analysis, and SCCWRP will provide data storage service. These sensors will allow us to collect continuous, high quality data to identify variability patterns in oxygen, pH, and CO₂, which will enable identification of spatial and temporal trends and a variety of modeling and biogeochemical assessment studies aimed at understanding the contribution of local anthropogenic nutrients sources to OAH and HABs, as well as informing restoration efforts by the SMBNEP.

While assessment of climate change impacts was not specifically listed as an objective in the CMP because the issue drew little attention back in 2007, nutrients monitoring implemented under the CMP is essential for understanding the potential impacts of nutrient loading on OAH. Monitoring and modeling associated with the above activities also ultimately contribute to, or supplement data collection efforts identified in the CMP. Results from these activities will also guide future update of the CMP to reflect the shift in research and management priorities.

Nutrient Loading and Impact Assessment – Significant progress continued in 2015 in monitoring and assessment of nutrient loading, primarily through 1) the Bight' 13 regional subsurface chlorophyll concentration survey, 2) completion of the special study to examine existing data relative to nutrient loading and receiving water impacts due to discharges of the HTP and the JWPCP, and 3) a two-year receiving water sampling program began in 2014 to determine rates of nutrient uptake, conversion, respiration, and primary production (See Appendix A and B for details). These efforts will help to determine the frequency, spatial extent

and seasonality of algal blooms (high chlorophyll features) in the southern California Bight (SCB) and how anthropogenic nutrient inputs affect ecological processes and rates that drive biological productivity, concentrations of dissolved oxygen, and aragonite saturation state.

Pelagic Ecosystem Monitoring – The LACSD and the City of LA continue to follow up the new collaborative effort initiated by these entities with the SMBNEP in 2014. Two efforts have been made to investigate a viable approach to fill the data gap in ichthyoplankton monitoring. The first effort, initiated by LACSD staff, focuses on examining the temporally and spatially extensive pelagic monitoring data collected under the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program, include sampling of multiple water parameters, fish larvae, and zooplankton. LACSD will evaluate their applicability to the CMP by comparing CalCOFI results from sites within the Santa Monica Bay with comparable inshore sites from other parts of the SCB.

The second effort is a newly proposed special study under the NPDES permits to assess the applicability of ichthyoplankton meta-barcoding for routine monitoring. The ultimate goal of the study is to develop a framework for cost-effective and informative ichthyoplankton monitoring within the coastal waters of Santa Monica Bay and beyond. The study will be conducted jointly by the LACSD and City of LA in conjunction with the Southern California Coastal Water Research Project (SCCWRP), as well as several other POTWs in the Southern California Bight. This study will provide a long overdue snapshot of the current ichthyoplankton community within Santa Monica Bay and allow comparison with other nearshore areas of the SCB using traditional morphological taxonomic identifications. If meta-barcoding is deemed an accurate and cost-effective substitute for traditional taxonomic analysis, monitoring may be incorporated within future Bight Regional Monitoring Programs administered by the SCCWRP to assess the entire SCB and allow comparisons with conditions in Santa Monica Bay.

Wetland Monitoring Protocol Development and Pre- Post- Wetland Restoration

Monitoring – There is still a lack of mechanism and commitment for systematic, long-term monitoring of wetland habitats in the Bay. However, the SMBNEP has been directly involved in wetland monitoring and partially filled the gap in recent years with funding support from the Coastal Conservancy and State Parks. The Bay Foundation (TBF) has carried out baseline monitoring at the Ballona Wetlands and several technical memoranda, publications, and a final, cumulative, five-year report were completed in 2015. In partnership with TBF, the SMBNEP has also been carrying out the pre- post restoration monitoring at Malibu Lagoon. 2015 marked completion of the third post-restoration monitoring year and a three-year comprehensive monitoring report has been developed and planned for release soon. With support of U.S. EPA Wetland Development Grant Program, SMBNEP has also been collaborating with SCCWRP and CalState Channel Islands for development of a regional Level-3 long-term monitoring program for wetland habitats.

The increased level of efforts supporting implementation of the CMP in 2015 is encouraging. However, full implementation of the CMP remains a major challenge as it requires secured long-term funding and more stakeholder commitment. With the support of the LARWQCB, the SMBRC is committed to continue working collaboratively with existing partners and facilitate participation of more stakeholders to fully implement the CMP. In the meantime, the SMBRC's

TAC will evaluate the need to revise and update the CMP based on new scientific findings, new data gaps identified for State of the Bay reporting, and the need to address changing management priorities and emerging issues.

Appendix A. Sanitation Districts of Los Angeles County Informational Report: Summary of Activities toward Implementation of the Santa Monica Bay Restoration Commission Comprehensive Monitoring Program, March, 2016.

Appendix B. City of Los Angeles Bureau of Sanitation Informational Report: Summary of Hyperion Treatment Plant Permit Requirements - Bay Comprehensive Monitoring Program Participation in 2015, March 2016

Appendix C. Chevron Products Company El Segundo Refinery: Bay Comprehensive Monitoring Program (CMP) Participation Annual Summary, March 2016

Table 1: Status of Santa Monica Bay Comprehensive Monitoring Program (CMP) Implementation
(New activities in 2014 is highlighted in yellow)

Habitat/ Ecosystem	Program Objective and Component	Implementation Status	LACSD Participation	City of LA Participation	Chevron Participation	Next Steps (If Needed)
Pelagic	Existing CalCOFI grid (101 stations in So. Cal.) for chlorophyll, zooplankton, sea surface temperature, salinity, thermocline depth, dissolved oxygen, silicate, nutrients, primary productivity	On-going, LACSD conducted a review of CalCOFI data collected in SM Bay over the last 30 years	Yes	n/a	n/a	Continue
	Existing Central Bight Cooperative Water Quality Survey (CBCWQS, 84 stations) for chlorophyll, sea surface temperature, salinity, dissolved oxygen, transmissivity, pH, dissolved organic matter, thermocline depth. ADD: nutrients (nitrates, phosphates, ammonia, 15 stations)	On-going, except for monitoring of nitrate, nitrite, phosphate and silicate	Yes	Yes	Yes, 16 offshore stations in front of the Refinery	Add nutrients to the program. Add new mooring for continuously monitor pH, oxygen, chlorophyll, and other water parameters

	Fish larvae transects for measuring changes in relative abundance and frequency of occurrence of key species	A review of pelagic monitoring data collected through the CalCOFI program was conducted, and a special study was proposed to assess the applicability of ichthyoplankton meta-barcoding for routine monitoring	Yes	Yes	TBD	Continue
	Existing shoreline temperature network	On-going	n/a	n/a	n/a	Continue
	Existing CDFW recreational catch estimates, by fishing blocks (10)	On-going	n/a	n/a	n/a	Continue
	Existing NMFS Recfin sampling sites for numbers of recreational fishing trips and weight and # of fish caught	On-going	n/a	n/a	n/a	Continue
	Bottlenose dolphin & seabird surveys for relative abundance, location, timing, behavior, tissue contaminant levels on 30 inshore and offshore individuals	Several annual surveys were conducted in 2000s. Discontinued after 2010 due to lack of funding. Seabird tissue contamination survey was conducted as part of Bight 13.	May provide field and lab support for marine mammal tissue contamination surveys in conjunction with the Bight program	TBD	TBD	Seeking support; secure funding or in-kind service for implementation
	Existing CDPH Marine Biotxin Monitoring Program for toxin levels in shellfish and	On-going, multiple locations in Santa Monica Bay	Voluntarily collects one phytoplankton	Voluntarily collects three phytoplankton	TBD	Continue

	incidence of toxic blooms		sample per week for CDPH program	samples for the CDPH Program		
	Existing Coastal power plant impingement & entrainment	On-going	n/a	n/a	n/a	Continue
	Existing American Cetacean Society Gray Whale Census	On-going	n/a	n/a	n/a	Continue
	Existing SCCOOS Oceanography buoys	On-going	n/a	n/a	n/a	Continue
	Existing NMFS marine mammal stranding network	On-going	n/a	n/a	n/a	Continue
	Existing USFWS seabird conservation program for monitoring abundance, population status, and threats.	On-going	n/a	n/a	n/a	Continue
	Special harmful algal blooms studies	- Bight' 13 nutrient survey is underway and will continue through 2016	Yes, Bight' 13 nutrient survey only	Yes, Bight' 13 nutrient survey only	Yes, Bight' 13 nutrient survey only	Continue
Soft Bottom	Existing POTW and Bight Program for determining status of infauna, demersal fish, and macrofauna, tracking fish tissue contamination, sediment chemistry, and toxicity over time.	On-going	Yes, also repeated sediment coring survey at EPA's request and conducted water column DDT/PCB special study	Yes	Yes, limited to sediment chemistry only	Continue
	Existing CDFW recreational and commercial catch estimates, by fishing blocks	On-going	n/a	n/a	n/a	Continue

	North Bay ASBS survey (as portion of the Bight Program) for determining status of infauna, demersal fish, and macrofauna, tracking fish tissue contamination, sediment chemistry, and toxicity.	Partially carried out as part of the Bight '08	n/a	n/a	n/a	Next step TBD with SWRCB
	Special study for investigating inshore halibut nursery grounds	To be implemented	TBD	TBD	TBD	Seek funding to initiate the study
Hard Bottom	Random grid, 5 strata survey (120 stations) using CRANE protocol for invertebrates, fish, and algae	Partially carried out by LACSD, MPA Monitoring Enterprise, and SMBNEP's kelp restoration program	Yes	TBD	TBD	Seeking support; secure funding or in-kind service for long-term implementation
	CRKSC over-flights for estimating kelp canopy coverage	Implemented since 2002	Yes	Yes	Yes	Continue
	Existing CDFW recreational and commercial catch estimates, by fishing blocks	On-going	n/a	n/a	n/a	Continue
	Existing coastal power plant impingement of rocky reef organisms.	On-going	n/a	n/a	n/a	Continue
	Existing long-term rock-reef fish survey at Palos Verdes Point and King Harbor	On-going but intermittent due to lack of stable funding	Yes	n/a	n/a	Seek stable funding to ensure its continuation
	Existing Ocean Resource Enhancement Hatchery Program gill net assessment	On-going	n/a	n/a	n/a	Continue
	North Bay annual ASBS survey using CRANE protocol for invertebrates, fish, and algae	Partially implemented	Yes	n/a	n/a	Seeking support; secure funding or in-kind service for implementation

	Reconnaissance and 1/10 year survey of deep banks, canyons, shelf edge for species list, abundance, and distribution	To be implemented	May expand existing ROV monitoring program to assist the survey	TBD	TBD	Seeking support; secure funding or in-kind service for implementation
	Special study for assessing potential MPA sites	Completed as part of State MLPA process and through SMBNEP-sponsored studies	n/a	n/a	n/a	Transition to long-term MPA monitoring under the auspices of State MPA Monitoring Enterprise
	Special study for initial assessment of kelp reefs	Completed through SMBNEP-sponsored studies	n/a	n/a	n/a	n/a
	Special study for developing index of reef community condition	An index based on fish guild was developed as part of SMBNEP rocky reef study and Bight '08 survey. Further development of a community index is underway as part of the Bight 13 survey	Yes	TBD	TBD	Continue and complete development of the index
Rocky and Sandy Intertidal	3 existing and 8 additional MARINe rocky intertidal survey stations for suite of indicators (13 indicator species and physical conditions)	On-going but intermittent due to lack of stable funding	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
	Existing annual grunion survey for location, frequency, relative intensity of grunion runs (7	On-going but intermittently due to lack of stable	n/a	n/a	n/a	Seek stable funding to ensure its continuation

	stations).	funding				
	Annual surf-zone fish survey (3 stations)	To be implemented	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
	Bird roosting site (6 stations) and existing estuary (5 stations) survey for presence/absence, counts, timing of gulls, terns, and shorebirds	To be implemented	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
	Existing CDFW rare bird species survey for abundance of adults, young, total nesting attempt, etc. (4 beaches)	On-going	n/a	n/a	n/a	Continue
	Annual regional sandy beach plant survey for species, relative abundance, and location	Pilot surveys were conducted using the newly developed beach ecology monitoring protocol. More surveys are on hold due to lack of funding	n/a	n/a	n/a	Seeking support; secure funding or in-kind service for implementation
	Special study for developing index of rocky intertidal community condition	Expert panel continued developing the index with logistical support from SCCWRP.	n/a	n/a	n/a	
	Special study for potential grunion egg indicator	To be implemented	n/a	n/a	n/a	
	Special study for archiving historical bird survey data	To be implemented	n/a	n/a	n/a	

	Special study for developing index of regional bird community condition	To be implemented	n/a	n/a	n/a	
	Special study for investigating tissue contamination in surf-zone fish and sand crabs	To be implemented	n/a	n/a	n/a	
	Reconnaissance study of shallow nearshore infauna community	To be implemented	n/a	n/a	n/a	
Wetlands	IWRAP Bight-wide grid (60 stations bight-wide) for a suite of indicators (Stressors, CRAM, hydrology, physical processes, contamination, biochemistry, eutrophication, fish, and infauna birds)	Partially implemented as part of Bight '08	n/a	n/a	n/a	Seek stable funding to ensure its continuation
	Intensified random grid in the Bay (60 stations) for CRAM, inlet condition, tidal range, and plant community)	Partially implemented at targeted wetlands (Ballona and Malibu) as part of restoration project and EPA Wetlands Development Program	n/a	n/a	n/a	Seek stable funding to ensure its continuation
	Project-specific evaluations of hydrology, soils, key plant and animal taxa, including infauna, water quality, sediment chemistry, and sediment toxicity		n/a	n/a	n/a	

TBD: To be determined.